

# Rhodora

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## DRIFTING ALGAE.

FRANK S. COLLINS.

THE conditions for collecting marine algae differ much from those for other plants. Practically all marine algae are under water part of the time, and more than half the number of species grow below low water mark; some of course can be distinguished when passing over them in a boat, but many of the most interesting species grow at a depth below the range of vision. The only way to get at these in their homes is by dredging, a slow, uncertain process. As Farlow<sup>1</sup> says of the dredge, "One sometimes secures by its means rare species, but as a rule, a day of dredging is a day wasted." The only way in which good results can be secured, is by a thoroughly equipped expedition, working from a steamer and going carefully over the selected area systematically. That such work may produce good results is shown by the recent Vol. XXXI of the Bulletin of the Bureau of Fisheries, containing the Survey of the Wood's Hole region. But as to the prospect of getting a fairly complete representation of the flora of a region in this way, the land botanist can judge if he imagines himself getting the flora of a meadow by going over it in an aeroplane in a dark night, with a long-handled rake.

Ever since the beginning of the study of algae, our knowledge of the sublitoral<sup>2</sup> flora has been obtained from the "rejectamenta," plants washed ashore; often immense quantities of algae, in great variety,

<sup>1</sup> Farlow, *The marine algae of New England*, p. 22, 1881.

<sup>2</sup> Sublitoral is here used in the sense of below the litoral, the litoral region including the range between tide marks; in zoological terminology it has sometimes been used as meaning partly or nearly litoral, the prefix being used in the same sense as in subtropical; I use it here in the same sense as in subterranean.



are thrown ashore on beaches after storms. That this is the normal source for material is recognized in all the text books. "Collecting on sandy or gravelly beaches is very simple. One finds there only the Florideae and larger brown sea-weeds that are washed ashore after a storm."<sup>1</sup> "First, from the mass of material which the sea throws up upon the beaches and leaves behind it when the tide goes out. . . . By careful search among this material you will find all the deep water forms."<sup>2</sup> "A storm is often more productive than a dredging expedition."<sup>3</sup> "At the time of maturity, the algae of the deeper waters are more or less readily torn away from their attachments, rise to the surface or near it, and are drifted ashore. Consequently it is well to examine the masses of driftweed driven ashore, especially after storms, in search of these inhabitants of the deeper waters."<sup>4</sup> As might be inferred from the quotations given above, authors of manuals and floras have included algae picked up with those found actually attached; indeed, not to have done so would have left out a considerable part of the species, among them some of the most interesting. Occasionally attention has been called to some plant, from its recorded distribution unlikely to occur in the region where it came ashore, and it has been noted only as a waif, but as a rule, the question of origin has not been raised. Recently more consideration has been given to possible long distance transportation; Sauvageau, preliminary to giving a list of the algae of the Bay of Biscay,<sup>5</sup> says "Le temps a toujours été très calme durant mon séjour en Espagne, et les algues déposées sur le rivage n'étaient pas apportées de loin, comme cela arrive souvent après une tempête."

Reinke<sup>6</sup> enumerates three species which he considers as transported from their homes to the western Baltic, and not native there. Rosenvinge<sup>7</sup> gives a list of 48 species coming ashore on the west coast of Jutland, with indications as to their probable origin. Schiller's

<sup>1</sup> Farlow, l. c., p. 21.

<sup>2</sup> Hervey, *Sea Mosses*, p. 14, 1881.

<sup>3</sup> Murray, *An introduction to the study of seaweeds*, p. 27, 1895.

<sup>4</sup> Setchell, *Directions for collecting and preserving marine algae*. *Erythea*, Vol. VII, p. 24, 1899.

<sup>5</sup> Sauvageau, *Note préliminaire sur les algues marines du golfe de Gascogne*. *Journal de Botanique*, Vol. XI, p. 3 (of reprint), 1897.

<sup>6</sup> Reinke, *Ueber Gaste der Ostseeflora*. *Berichte der deutschen Botanische Gesellschaft*, Vol. X, p. 2, 1892.

<sup>7</sup> Rosenvinge, *Om fremmede Alger ilanddrevne paa Jyllands Vestkyst*. *Bot. Tidsskrift*, Vol. XXVII, p. 83, 1905.



recent paper <sup>1</sup> is concerned chiefly with algae that have a definite and prolonged unattached existence, usually with change of form from that of the fixed state, to adapt the plant to the unattached state; the possibility of transportation to considerable distances is however also discussed. That unless this possibility is taken into account one may be led into serious errors, was shown me by a recent experience.

On October 8, 1913, I visited the ocean shore of Eastham, Massachusetts, near the Nauset lighthouse. From Chatham to Highland Light in Truro the shore stretches for about 25 miles in a nearly straight line; a rather steep beach of shifting sand, overlooked by sand dunes. No algae ever grow here, and as off shore the bottom is the same loose sand with more or less shifting bars a short distance out, the occurrence of algae below low water mark is improbable. All I had found on my many visits here had been scraps, more or less battered, the same as one might find floating anywhere in Massachusetts Bay or Nantucket Sound. But on this occasion as I looked from the dunes I saw plants of good size washing up and down in the waves, and on going down I found to my surprise that the beach was strewn with *Laminaria*, and that not *L. Agardhii* Kjell., the common species of southern New England, but *L. longicuris* De la Pyl., a northern species, occurring south of Nahant only at a few isolated stations. They were not battered and waterworn plants, but perfectly fresh, and were of all sizes from young plants 3–4 dm. high, to mature individuals, with stipe alone over three meters long. The small plants were often in clumps of a number of individuals, still attached at base to shells or pebbles; the laminae often bore abundant fruit. Along with the *Laminaria* were, almost equally abundant, but from their smaller stature less conspicuous, *Fucus vesiculosus* L., *Ascophyllum nodosum* (L.) Le Jolis, *Desmarestia aculeata* (L.) Lamour., and *Rhodymenia palmata* (L.) Grev. There had been a heavy surf for several days, and my first thought was that some colony in deeper water had been struck by it, but from what I knew of the bottom, I concluded that this would be very unlikely; moreover *Fucus* and *Ascophyllum* are littoral plants. They occur more or less all along the southern New England coast, but I know no station except Newport, Rhode Island, where the plants are at all luxuriant; usually they are much smaller than the northern form, or than the plants now in

<sup>1</sup> Schiller, Ueber Algentransport und Migrationsformationen im Meere. Internationale Revue der gesamten Hydrobiologie und Hydrographie, Vol. II, p. 62, 1909.



question. On the *Ascophyllum* were large tufts of *Polysiphonia fastigiata* (Roth) Grev., which occurs south of Cape Cod only rarely and in reduced form. The *Rhodymenia* fronds were large, often 3–4 dm. high and nearly as broad; and finally I found one fine tuft of *Halosaccion ramentaceum* (L.) J. Ag. and several plants of *Monostroma fuscum* (Post. & Rupr.) Wittr; the *Halosaccion* has not been recorded south of Marblehead, and a doubtful record of the *Monostroma* at Newport is the only one south of Boston. As epiphytes on the *Laminaria* I noted *Ceramium rubrum* (Huds.) Ag., *Chantransia* sp.?, *Pylaiella littoralis* (L.) Kjell., *Ectocarpus confervoides* (Roth) Le Jolis, *Antithamnion floccosum* (Muell.) Kleen and *Rhodochorton Rothii* (Eng. Bot.) Näg.<sup>1</sup>

All this taken together left no doubt in my mind that the northeast storm had brought the whole collection (there were thousands of *Laminarias* in sight) from the shores of northern New England. From the absence of other species of *Laminariaceae*, it is probable that they came from some quite limited station. I know of no point on the Massachusetts coast where *Laminaria longicruris* grows in large numbers, unmixed with other species of *Laminaria* or with *Alaria*, but on the Maine coast, east of Portland, there are stations where *L. longicruris* is abundant and unmixed with other *Laminariaceae*, usually in channels where there is a rather swift tidal current, but not exposed to the surf. If a gale happened to blow in a quarter that would send a heavy surf up such a channel, there might be torn up just such a "formation" or "facies" as I found, and the northeast wind might then carry it to the place where I found it. With the wind then prevailing it could hardly have originated west of Penobscot Bay, which would give 150 miles as the least distance it must have travelled. On returning to the beach the next day, I found the plants of the day before in a narrow windrow at high water mark, and rapidly decaying; the beach below and the water were bare and empty as usual.

Now if I had been on an unfamiliar shore, and was making a record of the plants of the region, I think that under the circumstances recorded, I should not have hesitated to enter in the list all the species I have named above; I have no doubt that some anomalies in regional

<sup>1</sup> It is noteworthy that among the 48 species recorded by Rosenvinge as coming ashore at Jutland, 44 were epiphytes on *Ascophyllum nodosum* and *Himanthalia lorea* (L.) Lyng. As long as the host plant is intact, the epiphytes find little change from their normal conditions, though most of them would speedily perish if detached from the host.



lists may be due to this cause; in this case it is only because the "consignment" came ashore at a point itself barren that the detection and correction is so easy; if it had been at a place where deep water plants from just off shore were also coming in, it might be quite perplexing. It may seem like severity to put all deep water plants on the waiting list until some dredging expedition vouches for their eligibility, but it may be the only safe way.

NORTH EASTHAM, MASSACHUSETTS.

## THE AMERICAN VARIATIONS OF *POTENTILLA* *PALUSTRIS*.

M. L. FERNALD AND BAYARD LONG.

(Plate 106).

IN 1908 attention was called by Dr. Theodor Wolf,<sup>1</sup> in his *Mono-graphie der Gattung Potentilla*, to the fact that in North America *Potentilla palustris* is not a uniform species but that the little known var. *villosa* (Pers.) Lehm., a plant of rare occurrence in northern Europe and possibly Greenland, is also found on the continent of North America (Cartwright, Manitoba). In 1909 our knowledge of var. *villosa* was sufficient to justify the statement that it is found "Throughout the St. Lawrence system from n. N. S. and e. Que. to L. Superior and L. Winnipeg,"<sup>2</sup> and in 1910 the plant was recorded as "the common form of the species in eastern Washington County, Maine."<sup>3</sup> In the study of this and other variants of *P. palustris* it has been necessary to look with some detail into the plant throughout its known range and into the very different treatments of its variations by authors, either as a *Potentilla* or as a separate genus, *Comarum*. As a result of these studies it seems to the writers that the plant in America falls into three well marked varieties with pronounced geographic ranges.

<sup>1</sup> Wolf. Mon. Pot. 76 (1908).

<sup>2</sup> Robinson & Fernald, RHODORA, xi. 48 (1909).

<sup>3</sup> Fernald & Wiegand, RHODORA, xii. 140 (1910).